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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,060	10/31/2003	Edward Durell Benjamin	138766	2583

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John S. Beulick
Armstrong Teasdale LLP
Suite 2600
One Metropolitan Square
St. Louis, MO 63102

EXAMINER	
VERDIER, CHRISTOPHER M	

ART UNIT	PAPER NUMBER
3745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

E

Office Action Summary	Application No.	Applicant(s)	
	10/699,060	BENJAMIN ET AL.	
	Examiner	Art Unit	
	Christopher Verdier	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10-31-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Receipt and entry of Applicants' Preliminary Amendment dated February 17, 2004 is acknowledged.

Specification

The abstract of the disclosure is objected to because it does not describe the portion of the disclosure that is directed to the apparatus; it only describes the portion of the disclosure directed to the method. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informality: Appropriate correction is required.

Paragraph 14 should end with a period.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 4, which recites that the purge slot is defined within at least a portion of the platform radially inner surface, has no antecedent basis in the specification for the underlined limitation.

Claim 8, which recites that the plural openings extend at least partially through the platform, has no antecedent basis in the specification for the underlined limitation.

Claim 9, which recites that at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform, has no antecedent basis in the specification for the underlined limitation.

Claim 12, which recites a purge slot formed within at least a portion of the platform radially inner surface, has no antecedent basis in the specification for the underlined limitation.

Claim 14, which recites at least a portion of the forward sidewall is recessed, has no antecedent basis in the specification for the underlined limitation.

Claim 15, which recites at least one angle wing, and at least a portion of the shank forward sidewall radially inward from the at least one angel wing is recessed, has no antecedent basis in the specification for the underlined limitations.

Claim 17, which recites at least a portion of the platform is chamfered, has no antecedent basis in the specification for the underlined limitation.

Claim 18, which recites at least a portion of the trailing edge sidewall is recessed, between the platform outer and inner surfaces, has no antecedent basis in the specification for the underlined limitation.

Claim 21, which recites that at least one of the leading edge seal pin cavity and trailing edge seal pin cavity is defined by the pair of substantially parallel axially disposed sidewalls, has no antecedent basis in the specification for the underlined limitation.

Claim 25, which recites a purge slot defined within at least a portion of the platform radially inner surface, has no antecedent basis in the specification for the underlined limitation.

Claim 27, which recites at least a portion of the first rotor blade shank upstream sidewall is recessed, has no antecedent basis in the specification for the underlined limitation.

Claim 28, which recites at least one angle wing, and at least a portion of the shank forward sidewall radially inward from the at least one angel wing is recessed, has no antecedent basis in the specification for the underlined limitations.

Claim 30, which recites at least a portion of the first rotor blade platform is chamfered, has no antecedent basis in the specification for the underlined limitation.

Claim 31, which recites at least a portion of the trailing edge sidewall is recessed, has no antecedent basis in the specification for the underlined limitation.

Claim 34, which recites at least one of the first rotor blade leading edge seal pin cavity and the trailing edge seal pin cavity is defined by the pair of substantially parallel axially disposed sidewalls, has no antecedent basis in the specification for the underlined limitation.

Examiner's Suggestion to Claim Language

The following is a suggestion to improve the clarity and precision of the claims:

In claim 1, line 10, -- internal -- may be inserted after "blade".

Claim Objections

Claims 1-10, 17, and 27 are objected to because of the following informalities: Appropriate correction is required.

In claim 1, line 10, "an" should be changed to -- a --.

In claim 17, line 2, -- a -- should be inserted after "reducing".

In claim 27, line 2, -- said -- should be inserted after "of".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 11, and 23-24 are rejected under 35 U.S.C. 102(e) as being anticipated by McRae 6,923,616. Note the method of assembling a rotor assembly for a gas turbine engine, comprising providing a first rotor blade 52 that includes an airfoil 60, a platform 62, a shank 64, an internal cavity 82, and a dovetail 66, wherein the airfoil extends radially outward from the platform, the platform includes a radially outer surface and a radially inner surface, the shank extends radially inward from the platform, and the dovetail extends from the shank, such that the internal cavity is defined at least partially by the airfoil, the platform, the shank, and the dovetail, coupling the first rotor blade to a rotor shaft 32 using the dovetail such that during engine operation, cooling air is channeled from the blade cavity through a blade impingement cooling circuit 132 for impingement cooling the first rotor blade platform radially inner surface, and coupling a second adjacent rotor blade to the rotor shaft such that an unnumbered platform gap is defined between the first and second rotor blade platforms, with each shank including a pair of opposing sidewalls 120, 122 that extend generally axially between an upstream sidewall 124 and a downstream sidewall 126, the coupling a second rotor blade to the rotor shaft further comprises

coupling the second rotor blade to the shaft such that an unnumbered shank cavity near 64 is defined between the first and second rotor blade shanks. Also disclosed is a rotor blade for a gas turbine engine having the above features.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Claims 1-3, 7-8, 11-12, 16-17, 23-25, and 29-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Wilson 5,281,097. Note the method of assembling a rotor assembly for a gas turbine engine, comprising providing a first rotor blade 18 that includes an airfoil 20, a platform 22, a shank 24, an internal cavity near 39, and a dovetail 16, wherein the airfoil extends radially outward from the platform, the platform includes a radially outer surface and a radially inner surface, the shank extends radially inward from the platform, and the dovetail extends from the shank, such that the internal cavity is defined at least partially by the airfoil, the platform, the shank, and the dovetail, coupling the first rotor blade to an unnumbered rotor shaft using the dovetail such that during engine operation, cooling air is channeled from the blade cavity through a blade impingement cooling circuit 56 for impingement cooling the first rotor blade platform radially inner surface, and coupling a second adjacent rotor blade to the rotor shaft such

that a platform gap 26 is defined between the first and second rotor blade platforms, with each shank including a pair of unnumbered opposing sidewalls that extend generally axially between an unnumbered upstream sidewall and an unnumbered downstream sidewall, the coupling a second rotor blade to the rotor shaft further comprises coupling the second rotor blade to the shaft such that an unnumbered shank cavity is defined between the first and second rotor blade shanks. During operation, cooling air is channeled from the shank cavity through a purge slot 46 defined within a portion of the platform radially inner surface. Concerning claim 7, the shank cavity is pressurized by airflow entering the cavity through a recessed portion 54 defined radially inward from an unnumbered angel wing extending outwardly from the rotor blade shank upstream sidewall. Concerning claim 8, a portion of the platform is convectively cooled by cooling air channeled through plural openings 46 extending partially through the platform. Concerning claims 12 and 25, the purge slot 46 is configured to channel cooling air through the purge slot for purging the gap 26 between adjacent rotor blade platforms. Concerning claims 16 and 29, the platform further comprises an unnumbered convex-side wall, an unnumbered concave-side wall and a plurality of convection cooling openings 46, the convex-side and concave-side walls each extend between the platform radially outer and radially inner surfaces, and the plurality of convection cooling openings 46 extend between the cavity and the platform concave-side wall for supplying cooling air for convective cooling of the platform concave-side wall. Concerning claims 17 and 30, a portion (the angled portion of the slot near 44 in figure 4) is chamfered to facilitate reducing a heat transfer coefficient of at least a portion of the platform. Also disclosed is a rotor blade for a gas turbine engine having the above features.

Claims 1-5, 8, 11, 13-17, 23-24, and 26-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee 6,341,939. Note the method of assembling a rotor assembly for a gas turbine engine, comprising providing a first rotor blade 10 that includes an airfoil 18, a platform 20, a shank 22, an internal cavity 28, and a dovetail 24, wherein the airfoil extends radially outward from the platform, the platform includes a radially outer surface and a radially inner surface, the shank extends radially inward from the platform, and the dovetail extends from the shank, such that the internal cavity is defined at least partially by the airfoil, the platform, the shank, and the dovetail, coupling the first rotor blade to an unnumbered rotor shaft using the dovetail such that during engine operation, cooling air is channeled from the blade cavity through a blade impingement cooling circuit 36 for impingement cooling the first rotor blade platform radially inner surface, and coupling a second adjacent rotor blade to the rotor shaft such that an unnumbered platform gap is defined between the first and second rotor blade platforms, with each shank including a pair of unnumbered opposing sidewalls that extend generally axially between an unnumbered upstream sidewall and an unnumbered downstream sidewall, the coupling a second rotor blade to the rotor shaft further comprises coupling the second rotor blade to the shaft such that an unnumbered shank cavity is defined between the first and second rotor blade shanks. During operation, cooling air is channeled from the shank cavity through a purge slot 42 defined within a portion of the platform radially inner surface. During operation, the platform radially outer surface is film cooled as well as convectively cooled by cooling air channeled through plural film cooling holes 38 that extend between the platform radially inner and outer surfaces. Concerning claims 14 and 27, the shank extends axially between an unnumbered forward sidewall and an unnumbered aft sidewall, with a portion of the forward

sidewall being recessed underneath the platform near 18c in figure 2, to facilitate increasing pressure of cooling air supplied through the plural film cooling openings. Concerning claims 15 and 28, note the angel wing 20d extending outward from the shank forward sidewall, with an unnumbered portion of the shank forward sidewall radially inward from the angel wing 20d being recessed, to facilitate pressurizing the shank cavity. Concerning claims 16 and 29, the platform further comprises an unnumbered convex-side wall, an unnumbered concave-side wall and a plurality of convection cooling openings 38, the convex-side and concave-side walls each extend between the platform radially outer and radially inner surfaces, and the plurality of convection cooling openings 38 extend between the cavity and the platform concave-side wall for supplying cooling air for convective cooling of the platform concave-side wall. Concerning claims 17 and 30, a portion (the angled portion near 20b in figure 4) is chamfered to facilitate reducing a heat transfer coefficient of at least a portion of the platform. Also disclosed is a rotor blade for a gas turbine engine having the above features.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6, 9, 18, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over either (McRae 6,923,616 or Wilson 5,281,097, or Lee 6,341,939) in view of Chamberlin 2,915,279. McRae, Wilson, and Lee all disclose methods of assembling a rotor assembly for a gas turbine engine and rotor blades for the gas turbine engine substantially as claimed as set forth above, but do not disclose that the shank cavity is facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall (claim 6), and do not disclose that during operation at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform (claims 9, 18, and 31).

Chamberlin shows cooled turbine blades 11 having platforms 12 with shank cavities 22 therebetween that are underneath the platforms, with the shank cavities being facilitated to be pressurized by airflow entering the cavities through recessed portions 24 of rotor blade shank upstream sidewalls 15, and with at least a portion of trailing edges of the platforms near 16 being facilitated to be cooled by cooling air channeled through recessed portions 26 of the platforms, for the purpose of creating eddies or vorticies in the cavities to improve the cooling effect of

cooling air such that substantially the whole inner surfaces of the cavities are swept by cooling air.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades of either McRae, Wilson, or Lee such that the shank cavity is facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall, and such that during operation at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform, as taught by Chamberlin, for the purpose of creating eddies or vorticies in the cavities to improve the cooling effect of cooling air such that substantially the whole inner surfaces of the cavities are swept by cooling air.

Claims 19, 21-22, 32, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over either (McRae 6,923,616 or Wilson 5,281,097, or Lee 6,341,939) in view of Tomberg 6,808,368. McRae, Wilson, and Lee all disclose methods of assembling a rotor assembly for a gas turbine engine and rotor blades for the gas turbine engine substantially as claimed as set forth above, but do not disclose that the shank further comprises a leading edge seal pin cavity and a trailing edge seal pin cavity with each seal pin cavity configured to facilitate sealing between adjacent rotor blades (claim 19), with at least one of the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls (claims 21 and 34), with the radially outer oblique sidewall

facilitating enhancing radial pin sealing between adjacent rotor blades (claims 22 and 35), with the seal pin cavities sized to receive a seal pin therein to facilitate sealing between adjacent blades (claim 32).

Tomberg (figure 3) shows rotor blades for a gas turbine engine, having shanks 32, with each shank further comprising an unnumbered leading edge seal pin cavity and an unnumbered trailing edge seal pin cavity with each seal pin cavity configured to facilitate sealing between adjacent rotor blades, with the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by an unnumbered radially outer sidewall that extends obliquely between the axially disposed sidewalls, with the radially outer oblique sidewall facilitating enhancing radial pin sealing between adjacent rotor blades, with the seal pin cavities sized to receive a seal pin therein to facilitate sealing between adjacent blades, for the purpose of providing blade to blade sealing between adjacent rotor blade platforms 30.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades of either McRae, Wilson, or Lee such that the shank further comprises a leading edge seal pin cavity and a trailing edge seal pin cavity with each seal pin cavity configured to facilitate sealing between adjacent rotor blades, with at least one of the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls, with the radially outer

oblique sidewall facilitating enhancing radial pin sealing between adjacent rotor blades, and with the seal pin cavities sized to receive a seal pin therein to facilitate sealing between adjacent blades, as taught by Tomberg, for the purpose of providing blade to blade sealing between adjacent rotor blade platforms.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 2, 3, 4, 5, 7, 8, and 10 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 3, 6, 6, 2, 2, 10, respectively, of copending Application No. 10/828,133 in view of Wilson 5,281,097. The above claims of the copending application 10/828,133 claim substantially the same subject matter as the above claims of the instant application, including a method for assembling a rotor assembly for a gas turbine engine, but do not claim that the airfoil extends radially outward from the platform, do not claim that the shank extends radially inward from the platform, do not claim that the dovetail extends from the shank, and do not claim that the internal cavity is defined at

least partially by the airfoil, the platform, and the dovetail, and do not claim that during operation, cooling air is channeled from the shank cavity through a purge slot defined within at least a portion of the platform radially inner surface.

Wilson shows a cooled rotor blade 18 having an airfoil 20 that extends radially outward from a platform 22, a shank 24 that extends radially inward from the platform, and a dovetail 16 that extends from the shank, with an internal cavity 39 defined at least partially by the airfoil, the platform, and the dovetail, such that during operation, cooling air is channeled from the shank cavity through a purge slot 46 defined within at least a portion of the platform radially inner surface, for the purpose of forming a blade under platform cooling circuit.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades in the above claims of copending application 10/828,133 such that the airfoil extends radially outward from the platform, the shank extends radially inward from the platform, the dovetail extends from the shank, the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, and such that that during operation, cooling air is channeled from the shank cavity through a purge slot defined within at least a portion of the platform radially inner surface, as taught by Wilson. Concerning the additional limitations recited in the claims of the copending application, such as the leading edge, trailing edge, and trailing edge openings, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to eliminate these features for the purposes of reducing complexity and cost.

Claims 6 and 9 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2 and 2 of copending Application No. 10/828,133 and Wilson 5,281,097 as applied above, and further in view of Chamberlin 2,915,279. The modified method for assembling a rotor assembly of claim 2 of the copending application claims all of the subject matter except for the shank cavity being facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall (claim 6), and except for during operation, at least a portion of a trailing edge of the platform being facilitated to be cooled by cooling air channeled through a recessed portion of the platform (claim 9).

Chamberlin shows cooled turbine blades 11 having platforms 12 with shank cavities 22 therebetween that are underneath the platforms, with the shank cavities being facilitated to be pressurized by airflow entering the cavities through recessed portions 24 of rotor blade shank upstream sidewalls 15, and with at least a portion of trailing edges of the platforms near 16 being facilitated to be cooled by cooling air channeled through recessed portions 26 of the platforms, for the purpose of creating eddies or vorticies in the cavities to improve the cooling effect of cooling air such that substantially the whole inner surfaces of the cavities are swept by cooling air.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified rotor blade assembly method of claim 2 of

copending application 10/828,133 such that the shank cavity is facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall, and such that during operation at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform, as taught by Chamberlin.

Claims 11, 12, 13, 16, 17, 19, and 20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11, 12, 13, 11, 11, 17, and 17, respectively, of copending Application No. 10/828,133 in view of Wilson 5,281,097. The above claims of the copending application 10/828,133 claim substantially the same subject matter as the above claims of the instant application, including a rotor blade for a gas turbine engine, but do not claim that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail.

Wilson shows a cooled rotor blade 18 having an airfoil 20, a platform 22, a shank 24, and a dovetail 16, with an internal cavity 39 defined at least partially by the airfoil, the platform, and the dovetail, such that during operation, cooling air is channeled from the shank cavity, for the purpose of forming a blade under platform cooling circuit.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades in the above claims of copending application 10/828,133 such that the internal cavity is defined at least partially by the airfoil, the platform,

and the dovetail, as taught by Wilson. Concerning the additional limitations recited in the claims of the copending application, such as the recessed area, and the airfoil first sidewall and second sidewall, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to eliminate these features for the purposes of reducing complexity and cost.

Claim 18 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 11 of copending Application No. 10/828,133 and Wilson 5,281,097 as applied above, and further in view of Chamberlin 2,915,279. The modified rotor blade of claim 11 of the copending application claims all of the subject matter except for at least a portion of a trailing edge of the platform being recessed between the platform radially outer and inner surfaces to facilitate platform trailing edge cooling.

Chamberlin shows cooled turbine blades 11 having platforms 12 with shank cavities 22 therebetween that are underneath the platforms, with at least a portion of trailing edges of the platforms near 16 being facilitated to be cooled by cooling air channeled through recessed portions 26 of the platforms, for the purpose of creating eddies or vorticies in the cavities to improve the cooling effect of cooling air such that substantially the whole inner surfaces of the cavities are swept by cooling air.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified rotor blade of claim 11 of copending application

10/828,133 such that the shank cavity is facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall, and such that during operation at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform, as taught by Chamberlin.

Claims 21-22 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 17 of copending Application No. 10/828,133 and Wilson 5,281,097 as applied above, and further in view of Tomberg 6,808,368. The modified rotor blade of claim 17 of the copending application claims all of the subject matter except for at least one of the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls (claim 21), and except for the radially outer oblique sidewall facilitating enhancing radial pin sealing between adjacent rotor blades (claim 22).

Tomberg (figure 3) shows rotor blades for a gas turbine engine, having shanks 32, with each shank further comprising an unnumbered leading edge seal pin cavity and an unnumbered trailing edge seal pin cavity with each seal pin cavity configured to facilitate sealing between adjacent rotor blades, with the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by an unnumbered radially outer sidewall that extends obliquely between the axially disposed sidewalls, with the radially outer oblique sidewall facilitating enhancing radial pin sealing

between adjacent rotor blades, with the seal pin cavities sized to receive a seal pin therein to facilitate sealing between adjacent blades, for the purpose of providing blade to blade sealing between adjacent rotor blade platforms 30.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified rotor blade of claim 17 of the copending application such that at least one of the leading edge seal pin cavity and the trailing edge seal pin cavity is defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls, and such that the radially outer oblique sidewall facilitates enhancing radial pin sealing between adjacent rotor blades, as taught by Tomberg.

Claims 23, 24, 25, 26, 27, 29, 30, 32, and 33 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 20, 21, 21, 23, 24, 21, 21, 25, and 26, respectively, of copending Application No. 10/828,133 in view of Wilson 5,281,097. The above claims of the copending application 10/828,133 claim substantially the same subject matter as the above claims of the instant application, including a rotor blade for a gas turbine engine, but do not claim that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, and do not claim an impingement cooling circuit extending through a portion of the shank for channeling cooling air from the blade cavity for impingement cooling the platform radially inner surface.

Wilson shows a cooled rotor blade 18 having an airfoil 20, a platform 22, a shank 24, and a dovetail 16, with an internal cavity 39 defined at least partially by the airfoil, the platform, and the dovetail, with an impingement cooling circuit 56 extending through a portion of the shank such that cooling air is channeled from the blade cavity, for the purpose of impingement cooling the platform radially inner surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades in the above claims of copending application 10/828,133 such that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, and such that an impingement cooling circuit extends through a portion of the shank for channeling cooling air from the blade cavity for impingement cooling the platform radially inner surface, as taught by Wilson. Concerning the additional limitations recited in the claims of the copending application, such as the platform recessed area and the airfoil trailing edge stress reduction, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to eliminate these features for the purposes of reducing complexity and cost.

Claim 31 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 21 of copending Application No. 10/828,133 and Wilson 5,281,097 as applied above, and further in view of Chamberlin 2,915,279. The modified rotor blade of claim 21 of the copending application claims all of the

subject matter except for at least a portion of a trailing edge of the platform being recessed between the platform radially outer and inner surfaces to facilitate platform trailing edge cooling.

Chamberlin shows cooled turbine blades 11 having platforms 12 with shank cavities 22 therebetween that are underneath the platforms, with at least a portion of trailing edges of the platforms near 16 being facilitated to be cooled by cooling air channeled through recessed portions 26 of the platforms, for the purpose of creating eddies or vorticies in the cavities to improve the cooling effect of cooling air such that substantially the whole inner surfaces of the cavities are swept by cooling air.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified rotor blade of claim 21 of copending application 10/828,133 such that the shank cavity is facilitated to be pressurized by airflow entering the cavity through a recessed portion of the rotor blade shank upstream sidewall, and such that during operation at least a portion of a trailing edge of the platform is facilitated to be cooled by cooling air channeled through a recessed portion of the platform, as taught by Chamberlin.

Claims 34-35 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 25 of copending Application No. 10/828,133 and Wilson 5,281,097 as applied above, and further in view of Tomberg 6,808,368. The modified rotor blade of claim 25 of the copending application claims all of the subject matter except for at least one of the leading edge seal pin cavity and the trailing

edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls (claim 34), and except for the radially outer oblique sidewall facilitating enhancing radial pin sealing between adjacent rotor blades (claim 35).

Tomberg (figure 3) shows rotor blades for a gas turbine engine, having shanks 32, with each shank further comprising an unnumbered leading edge seal pin cavity and an unnumbered trailing edge seal pin cavity with each seal pin cavity configured to facilitate sealing between adjacent rotor blades, with the leading edge seal pin cavity and the trailing edge seal pin cavity being defined by a pair of substantially parallel axially disposed sidewalls that are connected by an unnumbered radially outer sidewall that extends obliquely between the axially disposed sidewalls, with the radially outer oblique sidewall facilitating enhancing radial pin sealing between adjacent rotor blades, with the seal pin cavities sized to receive a seal pin therein to facilitate sealing between adjacent blades, for the purpose of providing blade to blade sealing between adjacent rotor blade platforms 30.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified rotor blade of claim 25 of the copending application such that at least one of the leading edge seal pin cavity and the trailing edge seal pin cavity is defined by a pair of substantially parallel axially disposed sidewalls that are connected by a radially outer sidewall that extends obliquely between the axially disposed sidewalls, and such

that the radially outer oblique sidewall facilitates enhancing radial pin sealing between adjacent rotor blades, as taught by Tomberg.

Claims 11, 13, 14, 15, 16, 17, and 19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11, 13, 13, 13, 11, 11, and 11, respectively, of copending Application No. 10/828,133 in view of Lee 6,341,939. The above claims of the copending application 10/828,133 claim substantially the same subject matter as the above claims of the instant application, including a rotor blade for a gas turbine engine, but do not claim that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail (claim 11), do not claim at least a portion of the forward sidewall being recessed to facilitate increasing pressure of cooling air supplied through the plural film cooling openings (claim 14), do not claim the shank comprising an angel wing extending outward from the shank forward sidewall, with at least a portion of the shank forward sidewall radially inward form the angel wing being recessed (claim 15), do not claim the platform comprising a convex-side wall, a concave-side wall and a plurality of convection cooling openings, the convex-side and concave-side walls each extending between the platform radially outer and radially inner surfaces, and the plurality of convection cooling openings extending between the cavity and the platform concave-side wall for supplying cooling air for convective cooling of the platform concave-side wall (claim 16), and do not claim a portion of the platform being chamfered to facilitate reducing a heat transfer coefficient of at least a portion of the platform (claim 17).

Lee shows a cooled rotor blade 18 having an airfoil 20, a platform 22, a shank 24, and a dovetail 16, with an internal cavity 39 defined at least partially by the airfoil, the platform, and the dovetail, such that during operation, cooling air is channeled from the shank cavity. At least a portion of a forward sidewall is recessed to facilitate increasing pressure of cooling air supplied through plural film cooling openings 38, and the shank comprises an angel wing 20d extending outward from the shank forward sidewall, with at least a portion of the shank forward sidewall radially inward form the angel wing being recessed, with the platform comprising an unnumbered convex-side wall, an unnumbered concave-side wall and a plurality of convection cooling openings 38, the convex-side and concave-side walls each extending between the platform radially outer and radially inner surfaces, and the plurality of convection cooling openings extending between the cavity and the platform concave-side wall for supplying cooling air for convective cooling of the platform concave-side wall, with a portion of the platform being chamfered near 20b in figure 4 to facilitate reducing a heat transfer coefficient of at least a portion of the platform, for the purpose of forming a blade under platform cooling circuit.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades in the above claims of copending application 10/828,133 such the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, with at least a portion of the forward sidewall being recessed to facilitate increasing pressure of cooling air supplied through the plural film cooling openings, with the shank comprising an angel wing extending outward from the shank forward sidewall, with at least a portion of the shank forward sidewall radially inward form the angel wing being recessed, with

the platform comprising a convex-side wall, a concave-side wall and a plurality of convection cooling openings, the convex-side and concave-side walls each extending between the platform radially outer and radially inner surfaces, and the plurality of convection cooling openings extending between the cavity and the platform concave-side wall for supplying cooling air for convective cooling of the platform concave-side wall, with a portion of the platform being chamfered to facilitate reducing a heat transfer coefficient of at least a portion of the platform, as taught by Lee. Concerning the additional limitations recited in the claims of the copending application, such as the recessed area, and the airfoil first sidewall and second sidewall, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to eliminate these features for the purposes of reducing complexity and cost.

Claims 23, 24, 26, 27, 28, 29, 30, 32, and 33 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 20, 21, 23, 24, 21, 21, 21, 25, and 25, respectively, of copending Application No. 10/828,133 in view of Lee 6,341,939. The above claims of the copending application 10/828,133 claim substantially the same subject matter as the above claims of the instant application, including a rotor blade for a gas turbine engine, but do not claim that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, and do not claim an impingement cooling circuit extending through a portion of the shank for channeling cooling air from the blade cavity for impingement cooling the platform radially inner surface.

Lee shows a cooled rotor blade 10 having an airfoil 18, a platform 20, a shank 22, and a dovetail 24, with an internal cavity 28 defined at least partially by the airfoil, the platform, and the dovetail, with an impingement cooling circuit 36 extending through a portion of the shank such that cooling air is channeled from the blade cavity, for the purpose of impingement cooling the platform radially inner surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the rotor blades in the above claims of copending application 10/828,133 such that the internal cavity is defined at least partially by the airfoil, the platform, and the dovetail, and such that an impingement cooling circuit extends through a portion of the shank for channeling cooling air from the blade cavity for impingement cooling the platform radially inner surface, as taught by Lee. Concerning the additional limitations recited in the claims of the copending application, such as the platform recessed area and the airfoil trailing edge stress reduction, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to eliminate these features for the purposes of reducing complexity and cost.

These are provisional obviousness-type double patenting rejections.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Demers is cited to show a turbine blade with an impingement cooled inner platform surface. This reference could also have been applied as it anticipates at least claim 1, but is not applied at this time to avoid multiple rejections.

Watanabe is cited to show a blade platform recessed adjacent a trailing edge.

Zagar, Hull, and Tomita are cited to show blade platform seal pins.

Dodd is cited to show a rotor blade with chamfered surfaces.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.
September 30, 2005

Christopher Verdier
Primary Examiner
Art Unit 3745